

ralizations which will not bear investigation, and are premature, to say the least of it. But this does not prevent our expressing our full sense of the very high value of this, and also of both the preceding parts of their 'Revision of the Palaeocrinoidea.' They have brought order out of chaos in a truly scientific manner, for which naturalists in general cannot be too grateful. The points on which we can venture to challenge their decision with respect to the value of species, genera, or families are indeed few and far between ; and if we cannot say the same upon certain morphological questions, we must remember that although the authors began their Crinoid work merely as collectors, they have strenuously endeavoured, more than any other American writers on the Pelmatozoa, to interpret the structure of their fossils by the only method which can possibly give any value to their conclusions, viz. a knowledge of the morphology of recent Echinoderms. Their latest publication is illustrated by half a dozen plates, the last four of which are filled up by diagrams of various kinds ; but the first two, which have been photographed from the drawings of Mr. Orestes St. John, are admirable expositions of actual structure as revealed by the choicest specimens at the disposal of the authors.

We shall look with very much interest for the publication of the concluding section of this most valuable work ; and we should be only too well pleased to hear that it is but the precursor of a larger one to be issued as one of the finely illustrated monographs of the United States Geological Survey. We have heard a rumour as to the possibility of this, and every palaeontologist will hope that it may prove to be a well-founded one.

P. HERBERT CARPENTER.

PROCEEDINGS OF LEARNED SOCIETIES.

GEOLOGICAL SOCIETY.

November 4, 1885.—Prof. T. G. Bonney, D.Sc., LL.D., F.R.S., President, in the Chair.

The following communications were read :—

1. "On the Premaxillaries and Scalpriform Teeth of a large Extinct Wombat (*Phascolomys curvirostris*, Ow.)." By Sir Richard Owen, K.C.B., F.R.S., F.G.S.

The specimen described in this paper is a cast from a fossil discovered in a late exploration of the Wellington bone-caves, and sent to the author with some other casts from the same collection by the authorities of the Australian Museum, Sydney, New South Wales.

The fragments in question consist of the premaxillary bones, containing a pair of scalpriform incisors, 160 millim. ($6\frac{1}{2}$ inches) long, measured along the outer curve.

The teeth and the fragments of bone in which they are implanted were described in detail, and referred to the Wombat family. The

animal to which they belonged must have been somewhat larger than *Phascolomys mediocris*, Owen, but less than the type of the subgenus *Phascolomys*. The specific name is suggested by the chief characters that distinguish the present form from any hitherto known, recent or extinct.

2. "On the Structure and Classificatory Position of some Madreporaria from the Secondary Strata of England and South Wales." By Prof. P. Martin Duncan, M.B., F.R.S., F.G.S.

This paper consisted chiefly of a criticism of the conclusions arrived at by Mr. R. F. Tomes in various papers communicated to the Society.

All the species of the genus *Astrocoenia* which were described in the Supplement to the British Fossil Corals, Pal. Soc. 1867, from the Infra-Lias of South Wales, belong to that genus, and not to *Styelastraea*, de From. The drawing of *Astrocoenia plana*, Dunc., given by Mr. Tomes, does not correspond with the type specimen of the species. *Styelastraea sinemuriensis* and *S. Martini*, de From., do not form part of the fauna of the Infra-Lias of South Wales. *Cyathocoenia*, Dunc., is not the same as *Phyllocoenia*, Laube, which is *Koilocenia*, Dunc. *Thecosmilia Martini* and *T. Michelini* of the European Hettangian are found in the Infra-Lias of England. *T. rugosa*, Laube, was first noticed in the Memoir of the Corals of the zone of *Ammonites angulatus*, Pal. Soc. 1867, and the species was properly figured. *Cladophyllia* is a subgenus of *Thecosmilia*. *Elysastrea*, Laube, has two well-marked species in the Sutton Stone. *Montlivaltia simplex* has the shape of the calice not merely dependent on pressure, but caused by normal growth. *M. Walliae*, Dunc., has no evidence of "rejuvenescence," and the growth noticed is endothechal, and would be termed by Lindström "stereoplasm." *M. polymorpha*, Terquem et Piette, remains a member of the Infra-Lias fauna. *M. pedunculata*, Dunc., is not a *Cladophyllia*, but a simple coral of the genus to which it was assigned by the author. The geological position of the Sutton Stone and associated deposits is, from the paleontological evidence, above the Rhaetic series.

The cast of a *Montlivaltia* figured by the author in the Memoir on the Corals of the Zone of *A. angulatus*, Pal. Soc. 1868, p. 68, does not coincide with *M. rhatica*, Tomes, but with *M. Haimei*. *M. foliacea*, Tomes, has not nine cycles of septa, as stated by its describer. The septal arrangement of *M. excavata*, Tomes, and *M. papyracea*, Tomes, is doubtful. *Thamnastraea* is not a perforate coral, but a Fungid. *Synastraea* and *Centrastraea* were not founded by M. de Fromental: the former originated with Milne-Edwards, and the latter with d'Orbigny. *Centrastraea* is not synonymous with *Astrocoemorpha*. *Orosoris* is not a perforate coral; and Milne-Edwards and Jules Haime were quite correct in stating that the genus "se rapproche beaucoup des *Comoseris*;" and it is incorrect to state that one genus really bears but a faint resemblance to the

other. *Oroseris* is a subgenus of *Comoseris*, which is not one of the *Perforata*.

Microsolena, Lmx., is one of the *Fungida*.

Cyathophyllia, E. de From., is posterior in date to *Antillia*, Dunc., and therefore *C. oolitica*, Tomes, is *Antillia oolitica*, Tomes, sp.; but as *Antillia* is a subgenus of *Circophyllia*, Edw. & H., the name should be *Circophyllia oolitica*, Tomes, sp.

What is termed the "rejuvenescence" of corals by some zoophytologists has been long recognized as irregularity of growth, and there should be no difficulty in distinguishing worn growth-rings from calicular gemmation; but this has been confounded with the other condition. *Oppelismilia*, Dunc., is retained as a subgenus of *Montlivaltia*. *Axosmilia Wrighti*, Edw. & H., and *Montlivaltia Holli* (*Oppelismilia*, Dunc.) are not identical: they are both simple corals and differ from the fasciculate and compound genus *Dona-cosmilia*, E. de From. *Epismilia* is a worthless genus, because one can never be certain that the septa were not once spinose; moreover the presence and absence of spines and dentations on the free edges of the septa are not of physiological importance, and there is no distinction to be made between the soft parts of the recent corals with and without ragged septa. *Clausastraea consobrina*, Edw. & H., is not a species of *Confusastraea*. *Isastraea tenuistriata*, M'Coy, sp., confounded with some other form, but not by its author, is a true Isastrean. *Confusastraea tenuistriata*, Tomes, cannot remain in the genus, for it has characters which do not belong to it. *Chorisastraea*, de From., is not a good genus according to Milne-Edwards and Jules Haime, Reuss and Stoliczka; it makes a method of growth which is common to several fossil and recent genera of primary importance. *Thecosmilia gregaria* and *T. obtusa* are names which should be retained, and the forms should be removed from *Chorisastraea*. *Heterogyra*, Reuss, is a good genus. *Sympyllum Etheridgii*, Dunc., belongs to the genus with which it is associated, and not to *Phyllogryra*, Tomes. *Thecoseris* is an epithetate *Leptophyllia*, and *T. polymorpha*, Tomes, is quite distinct in its morphology from *Turbinoseris* and *Palaeoseris*, Dunc. *Cryptocenia*, d'Orb., is an imperfectly distinguished genus, and is replaced by *Cyathophora*, Edw. & H. Therefore *Cyathophora tuberosa*, Dunc., which has not a close resemblance to *C. Luciensis*, Edw. & H., and also *C. Pratti*, Edw. & H., remain as good species of their genus. The septal arrangement of what is termed *Cryptocenia microphylla*, Tomes, is incorrectly given. *Montlivaltia caryophyllata*, Edw. & H., had not its septa wrongly described by its illustrious authors: Mr. Tomes says that they made an obvious mistake, and his own accusation proves that they were correct. The subject of fissiparity was not originally introduced by M. de Fromentel, but was well understood at the time when he wrote. The walls are not defective in corals increasing fissiparously. Fissiparity and gemmation were not confounded by Milne-Edwards and J. Haime or by the author. *Thecosmilia Slatteri*, Tomes, is a variety of *Cladophyllia Babeana*. The figure given by the author of *Thamnastraea Waltoni*, Edw. & H., has been misapprehended.

Isastraea oblonga, Edw. & H., was correctly described by those authors, and no addition to our knowledge of the form has been made. The genus *Isastraea* has its species budding within the calice and close to the outer wall, never, as stated, between the walls of calices. *Heliocænia* is a subgenus of *Styliina*, and differs from *Placocænia*, d'Orb. *Isastraea Conybearii*, Edw. & H., is a good species; it is not the same as *Clausastræa* = *Plerastræa Pratti*, Edw. & H. The type specimen of *Plerastræa Pratti*, Edw. & H., has a columella, and the authors of the genus did not describe it as having an essential columella. *Bathyænia*, Tomes: nothing was stated in the work called 'A Revision of the Genera of Madreporaria' about the similarity of this genus and *Stylosmilia*; this is a statement difficult of explanation.

Every one of these numerous statements is made in opposition to the opinions of Mr. Tomes. Proper acknowledgment is made regarding the useful knowledge conveyed by Mr. Tomes about the localities of corals and the zones which some frequent.

The author of this communication agrees with Mr. Tomes on two points: Mr. Tomes has shown that, owing to the matrix of *Cyclo-lites Lycetti*, Dunc., not being sufficiently removed, the form is his *Dimorphastræa dubia*, and that properly the generic name should be *Dimorphæa*. Again, Mr. Tomes has raised much doubt in the author's mind where a species placed by him under the genus *Lepidophyllia*, Dunc., should be placed: probably it will have to come within *Donacosmilia*, as stated by Mr. Tomes; but *Donacosmilia* requires careful working out.

3. "On the *Astroænia* of the Sutton Stone of the Infra-Lias of South Wales." By Prof. P. Martin Duncan, M.B., F.R.S., F.G.S.

The species which were placed in the genus *Astroænia*, and which came from the Sutton Stone and Broceastle deposits of the Infra-Lias of South Wales, were reexamined in the instance of *A. gibbosa*, *A. insignis*, *A. parasitica*, and *A. plana* (Dunc.). These species were originally described by the author in his 'Monograph of the British Fossil Corals,' second series, Pal. Soc. 1867, pt. iv. no. 1, and were illustrated. A good specimen of *A. gibbosa* is described, and its structures are shown to be strictly Astroænian. The different states of the corallites produced by various conditions, such as growth and gemmation, were explained. The same course was taken with reference to *A. insignis* and *A. parasitica*, and the density of the united walls was shown to have nothing to do with any intermural structure or cœnenchyma in that sense.

A. plana was critically examined, and as it has all the characters of typical *Astroænia*, it remains in that genus with the others.

November 18, 1885.—Prof. T. G. Bonney, D.Sc., LL.D., F.R.S., President, in the Chair.

The following communications were read:—

1. "Results of Recent Researches in some Bone-caves in North Wales (Fynnon Beuno and Cae Gwyn)." By Henry Hicks, M.D.,

F.R.S., F.G.S. With Notes on the Animal Remains, by W. Davies, Esq., F.G.S., of the British Museum (Nat. History).

This paper contained the results of researches carried on in these caverns in the summers of 1883, 1884, and 1885 by Mr. E. Bouvierie Luxmoore, of St. Asaph, and the author. The enormous collection of bones belonging to the now extinct animals of Pleistocene age obtained had been submitted for examination to Mr. W. Davies, and afterwards distributed to various museums. Several well-worked flint implements were also discovered in association with the bones.

The following are the conclusions arrived at by the author, from the facts obtained during the explorations:—That abundant evidence has been furnished to show that the caverns had been occupied by hyenas, and possibly by other beasts of prey, as dens, into which portions of carcasses of various animals had been conveyed in Pleistocene times. The very great abundance of some animals, such as the rhinoceros, horse, and reindeer, and the frequent presence of bones belonging to young animals, proved that the plain of the Vale of Clwyd, with that extending northward under the Irish Sea, must have formed a favourite feeding-ground even at that time. The flint implements and worked bones showed also that man was contemporary with these animals. The facts perhaps, however, of greatest importance, made out during these researches, are those which bear on some questions of physical geology in regard to this area, which hitherto have been shrouded more or less in doubt. The views on the physical conditions in Pleistocene times of the areas in North Wales in which these and the other bone-caverns occur, so ably put forward by Sir A. Ramsay, appeared to the author to be strongly supported by the results obtained in these explorations. The ravine in which the caverns occur must have been scooped out previous to the deposition in it of the glacial sands and Boulder-clays. This sand and clay, there seems good evidence to show, must have filled up the ravine to a height above the entrances to the caverns, and such sands and clays are now found at some points to completely fill up the caverns. How, then, did these sands and clays get into the caverns? Were they forced in through the entrances by marine action or by a glacier filling the valley? Or were they conveyed in subsequently to the deposition of the Boulder-clay in the valley and surrounding area? The position of the caverns in an escarpment of limestone, at the end of a ridge of these rocks, with a sharp fall on either side, prohibits the idea that the material could have been washed in from the higher ground, as has been suggested by some in the case of other caverns, if it had anything like its present configuration. Moreover, there is scarcely any deposit now visible upon the limestone ridge, and there is no certainty that there ever was deposited there any great thickness of such a clay as that now found in the caverns. The general position also of the bones in some of the tunnels seems to indicate clearly that the force which broke up the stalagmite floor, in some places 10–12 inches thick, and stalactites 6 to 8 inches across, which thrust many of the large and heavy

bones into fissures high up in the caverns and placed them at all angles in the deposit, must have acted from the entrance inwards, and the only force which seems to meet these conditions is marine action. The following seem to the author to be the changes indicated by the deposits. The lowest in the caverns, consisting almost entirely of local materials, must have been introduced by a river which flowed in the valley at a very much higher level than does the little stream at present. Gradually, as the valley was being excavated, and the caverns were above the reach of floods, hyænas and other beasts of prey occupied them, and conveyed the remains of other animals into them. Man also must have been present at some part of this period. Gradually the land became depressed, the animals disappeared, stalagmite was formed, and the sea at last entered the caverns, filling them up with sands and pebbles, and burying also the remains not washed out. Floating ice deposited in this sea the fragments of rocks derived from northern sources, and these became mixed with local rocks and clays brought down from surrounding areas. The greater part of the Boulder-clay in the Vale of Clwyd was probably deposited as the land was being raised out of this Mid-Glacial sea. During the process of elevation the caverns became again disturbed by marine action and the upper fine reddish loam and the laminated clays were deposited. It seemed to the author impossible to avoid the conclusion that these caverns must have been submerged, and afterwards elevated to their present height of about 400 feet above the level of the sea, since they were occupied by Palæolithic man and the Pleistocene animals.

2. "Description of the Cranium of a new Species of *Erinaceus* from the Upper Miocene of Oeningen." By R. Lydekker, B.A., F.G.S.

The Author described the palatal half of the cranium of a large species of *Erinaceus* from the Upper Miocene of Oeningen, which he regarded as closely allied to the existing *E. europaeus*, and proposed to name *E. oeningensis*.

3. "On the Occurrence of the Crocodilian Genus *Tomistoma* in the Miocene of the Maltese Islands." By R. Lydekker, Esq., B.A., F.G.S.

The Author described the anterior portion of the cranial rostrum of a Crocodilian from the Miocene of Malta, to which Prof. Sir R. Owen has given the MS. name of *Melitosaurus chamysooides*. The author considered that there were no characters by which the specimen could be generically distinguished from *Tomistoma*. Mention was made of a second crocodilian skull from the Miocene of the Maltese Islands, and of a third from Lower Austria, both of which the author thought might be included in the same genus.

January 13, 1886.—Prof. T. G. Bonney, D.Sc., LL.D., F.R.S.,
President, in the Chair.

The following communication was read:—

“On some Fish-remains from the Tertiary Strata of New Zealand.” By James W. Davis, Esq., F.G.S.

A number of fossil fish-remains from Tertiary beds in New Zealand have been forwarded to the author by Captain F. W. Hutton, and were described in the present paper. The forms of which descriptions were given are two new species of *Lamna*, *Carcharodon angustidens*, Agassiz, and a new *Carcharodon*, one new species of *Notidanus*, one of *Myliobatis*, and one referred to *Sparnodus*. All the above are founded on teeth. A vertebra of *Lamna* and a fish-spine were also described, and the collection contained a specimen regarded by the author as a fragment of a Reptilian tooth.

MISCELLANEOUS.

On the Question of the Origin of the European Races of Dogs.
By Prof. J. N. WOLDRICH.

I STAND now in the same position as formerly* with regard to this question. It is, I think, just as impossible to derive our races of dogs from one or all of our wild European Canidæ (wolf, jackal, and fox) as it is to derive the European races of men from one or more of the still extant savage peoples, or to obtain a European civilized race by continued culture from a Bosjesman. Only a very careful detailed study of the fossil remains of Canidæ can lead us in this respect into the right road. I have therefore already, in my writings on Diluvial Canidæ, sharply separated the *forms* which occur, without any reference to the apparently scarcely solvable question whether they were species, races, or varieties. A fusion of allied fossil forms may be left to further study; this can only be effected when the detailed knowledge of fossil forms has become much more extensive.

According to my investigations, the following forms of domestic dogs have been made known from alluvial, prehistoric, and early historic times by the discovery of their remains:—*Canis familiaris Spalletti*, Strobel; *C. familiaris palustris*, Rütim.; *C. familiaris palustris ladogensis*, Anučin; *C. familiaris intermedius*, Wold.; *C. familiaris Mostranzewi*, Anučin; *C. familiaris optime matris*, Jeitteles (two forms); and *C. familiaris decumanus*, Nehring. Of

* See the author's memoir “Ueber Caniden des Diluviums,” in Denkschr. k.-k. Akad. Wiss. in Wien, Band xxxix., and other papers.